

BINGHAMIA, THE ALGA, VERSUS BINGHAMIA, THE CACTUS

BY WILLIAM ALBERT SETCHELL AND ELMER YALE DAWSON

DEPARTMENT OF BOTANY, UNIVERSITY OF CALIFORNIA

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J. G. Agardh, in 1894, in the Continuatio II of his *Analecta Algologica*, made an observation at the bottom of page 63 which may be roughly translated as follows: "I am willing to constitute another genus, intermediate between *Herpophyllum* and *Nitophyllum*, given to me by Farlow from California under the name, unless I mistake myself, *Binghamiae*, by an author unknown to me. This plant, plane, strictly dichotomous, but augmented by segments arising from the margins, shows the habit of *Nitophyllum*, but has an entirely different structure in that internal and irregular lacunae are present between the surface tissues, the intervening diaphragms being rather irregularly cellular and at length sporangiiferous. I have seen cystocarps agreeing with those of other Delesseriaceae and the tetrasporangia grouped into sori, but from the structure of the frond I assume this plant to present a type diverse from that of other Delesseriaceae. I am ignorant as to where this plant was described, nor do I know whether a lawful name was bestowed upon it." So far as is known to us, this is the first time the name *Binghamia* appeared in print. Here it is accompanied by a partial diagnosis, recognized as of a distinct genus, but with an indefinite sponsor. No type species is mentioned, and the name is not in the nominative, but in the genitive form, "*Binghamiae*."

In August, 1892, J. G. Agardh, in a letter to W. G. Farlow wrote thus: "11.—The plant from California about which you asked me if it would be a new genus of mine, named *Binghamia*, seems really to be a new genus; but I don't remember that I have ever seen the plant before. Nor, I think, have I given that name to some other plant, though certainly I should wish that a genus of California remembered of the discoverer of several new California plants." This passage from J. G. Agardh's letter explains his mystification as expressed in various publications.

Farlow, too, was equally "mystified," since, from Agardh's letter he seems to have forgotten an earlier letter, to Mrs. C. P. Bingham, at that time in Santa Barbara, California, dated February 11 (probably 1879) in which he says: "The other plant first received from you and supposed to be a *Rhodophyllis* near *R. bifida* is undoubtedly a new species and perhaps a new genus. It is not a *Rhodophyllis* as the tetraspores are not zonate. Provisionally we will call it *Binghamia californica*, expecting, however, that farther study will induce us to put it into some old genus, in which case the species will be ———— *Binghamii*." It seems, therefore, that Farlow is responsible for the binomial *Binghamia californica* Farlow in

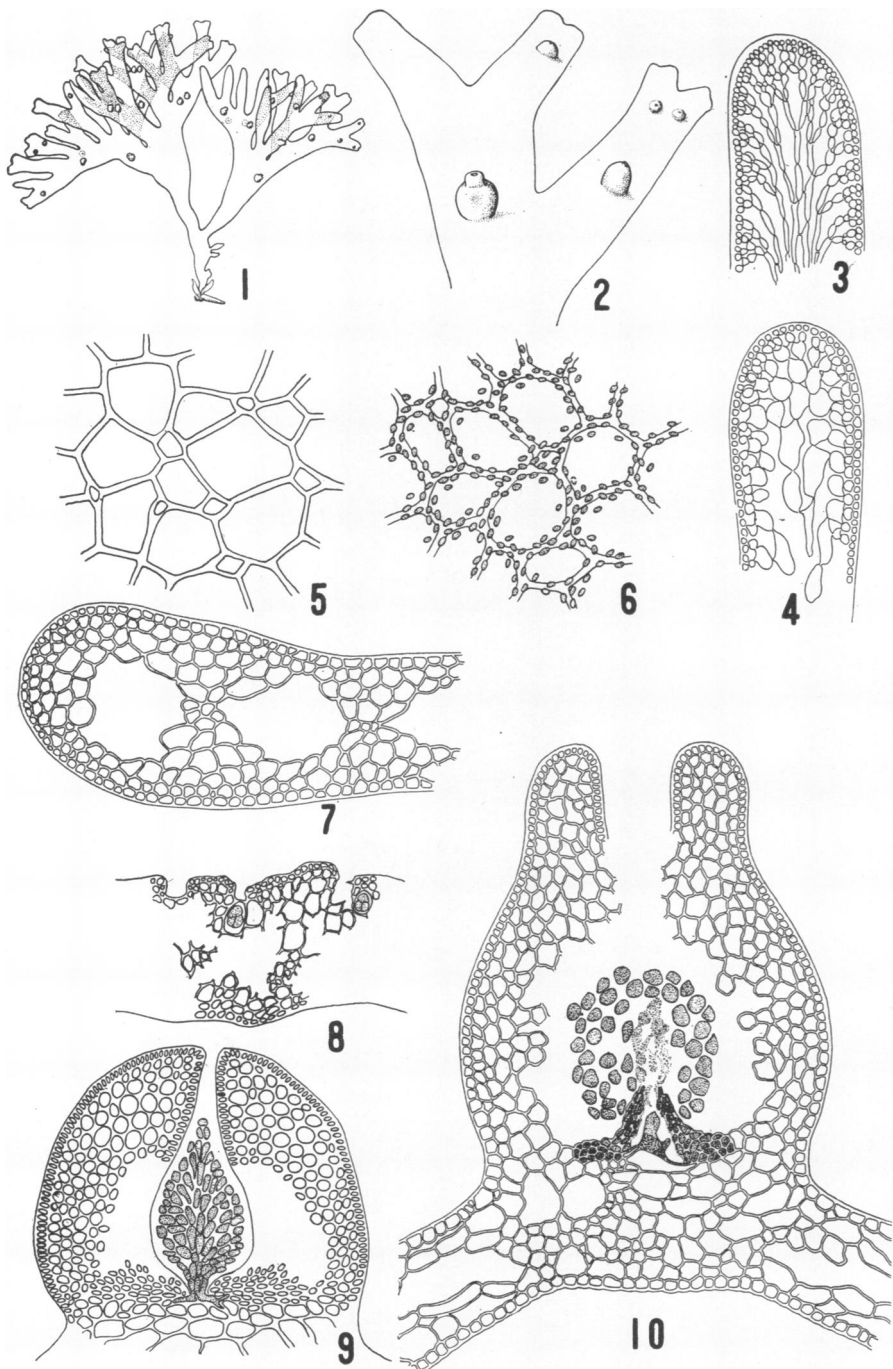
lit., but forgot this earlier christening of the species when he wrote to Agardh in 1892. In reply to his letter, Mrs. Bingham, on April 24 (1879) merely acknowledges the naming of the alga after her.

J. G. Agardh, evidently, kept the matter in mind, for in 1898, in his *De Dispositione Delesseriearum* under *Herpophyllum australe* J. Ag., he again speaks of having another species, sent to him under the name *Binghamia* and long preserved in his herbarium under this name, whether proposed by himself or by another, he does not at that time dare to say.

In 1899, J. G. Agardh, in his *Analecta Algologica*, Continuatio V, provides figures of portions of both the cystocarpic and the tetrasporic plants of *Binghamia californica*, with analyses of slight detail in the explanation. The figures, however, do not seem sufficiently accurate to distinguish the species.

In recent Japanese phycological literature the name *Binghamia californica* Farlow appears several times. At least three authors have credited the species as occurring in Japan, and a comparison of specimens from California and Japan reveals little upon which to base a firm distinction. The wide geographical discontinuity, however, leads us to suspect that distinction may ultimately be made. It was first identified and illustrated by Inagaki in a paper written in Japanese (1933). Segawa (1936 and 1938) records the species from the province of Izu and in the later publication illustrates tetrasporic sori. Okamura (1936, in Japanese) describes and illustrates *Binghamia californica*. He had apparently made some investigation of the history of the nomenclature, for he gives the name as *Binghamia californica* Farlow msr.

The genus *Binghamia* of red algae might be thoroughly validated by our giving complete Latin diagnoses of both the genus and the species *B. californica*, and continued without further discussion, were it not for the fact that Britton and Rose (*Cactaceae*, 2, 167 (1920) and 4, 279 (1923) proposed a genus *Binghamia* with four species, later increased to 19 by Backeberg, Werdermann and West. Most, if not all, of the species of this South American Cactaceous genus are in cultivation and some have become very well known. Though the algal binomial *Binghamia californica* may be considered somewhat better than a "nomen nudum," yet, on three points it is not acceptable according to the International Rules of Botanical Nomenclature, 1935: (1) The description by J. G. Agardh in 1894 was not in the form of a diagnosis, and no species was mentioned as a basis for the genus. (2) When the binomial *Binghamia californica* was first suggested by Farlow in the letter to Mrs. Bingham, it was used only as a tentative name. (3) The figures published by Agardh in 1899, accompanied only by meager diagnosis in the explanation of plates, do not show sufficient essential characters to be accepted under specification 3 of Article 44. Since the algal genus *Binghamia* cannot be considered



validly published, there are no rules which bar it from use for the genus of cacti. In order that the algal genus may fulfil the intentions of Farlow and J. G. Agardh as expressed earlier in this paper, and may maintain its alphabetical order in indices, it seems allowable to suggest the name *Binghamiella* in honor of Mrs. C. P. Bingham, leaving the Cactaceous genus to bear the name *Binghamia* in honor of Dr. Hiram Bingham, to whom it was dedicated and validated without question.

***Binghamiella* gen. nov.**

Binghamia Farlow in lit., 1879; J. G. Agardh, *Analecta Algologica*, Cont. II; 63, 1894 (footnote), Sp. Alg., 3 (3); 140, 1898, Sp. Alg. 3 (4); 134, 1901; Okamura, *Descriptions of Japanese Algae* (in Japanese); 689, 1936; Segawa, in *Sci. papers of the Inst. of Alg. Research, Fac. of Sci., Hokkaido Imp. Univ.*, II, 1; 150, 1938.

Frons e disco explanata pauca, compressa, sursum in laminis planis fere regulariter dichotomis; segmentis adultis anguste elongato cuneata intus cellulis magnis lacunas parvas irregulares medias includentibus, extus cellulis corticalibus paucistratosi, majoribus aliquante superficie hexagoniis et quibusque majoribus cellulis multo parvioribus imperfecte cinctis, iis apicalibus (et in partibus interne meristematicis) elongatis brevi filamentoides et in modo fontis exsurgentibus ordinatis; tetrasporangiis tripartitis, in cellulis externis oriendis, aetate provecta in soris, irregularibus, in cavernis vadosis

EXPLANATION OF PLATE

Binghamiella californica Setchell & Dawson

1. Habit of cystocarpic plant. $\times 1$ diam.
2. Upper lobes of same plant showing cystocarps in different stages of development. $\times 4$ diam.
3. Longitudinal section through a young tip of a frond, showing fountain type of apical growth. $\times 58$ diam.
4. Longitudinal section of older tip, showing condensation of filaments and beginnings of lacunae. $\times 58$ diam.
5. Surface view of adult frond of a cystocarpic plant. $\times 225$ diam.
6. Surface view of adult frond of a tetrasporic plant, the small, shaded cells projecting slightly beyond the ordinary cells. $\times 225$ diam.
7. Transverse section of an adult, cystocarpic frond showing lacunae, dissepiments and cortical tissues. $\times 58$ diam.
8. Transverse section of a tetrasporic plant (type!) showing tripartite tetraspores in sunken pits. $\times 50$ diam.
9. Vertical section through a young cystocarp, showing young, thick pericarp and young carpostome yet without "collar-like" rostrum, the pulvinus (or cushion) at the base, and the young gonimolobes. $\times 100$ diam.
10. Vertical section through a mature cystocarp with portions of adjacent frond, showing lacunae and adjacent tissues in the frond, the cushion, and ripe carpospores surrounding the disintegrating sterile portions of the gonimolobes (a composite drawing). $\times 58$ diam.

sparsis et superficie per magnitudine conspicuis; cystocarpiis sparsis nunc singulis, nunc pauciaggregatis, sessilibus, infra semiglobosis, superne abrupte angustatis brevicylindricisque, et per ostiolum late obconicum perforatis; gonimolobis massam globosam formantibus, inferne brevi stipitatis, superne in sporis plerumque transformatis; carposporis pyriformibus in modo cystocarpium Rhodymeniearum se ostendentibus; antheridiis nondum visis.

Binghamiella californica (Farlow *in lit.*) comb. nov.

Binghamia californica Farlow *in lit.* (1879); J. G. Agardh, Anal. Alg., Cont. V; 158, pl. 1, fig. 6a, 6b, 1899; Daniel Cleveland, Mar. Alg. of San Diego, 1880; Inagaki, Oshorowan oyobi soreni kinsetu seru Engan no Kaisankosōrui (Hōkkaidō-Teikoku-Daigaku, Rigakubu, Kaisō-kenkyuzyo Hokoku, No. 2) (in Japanese); 43, f. 16, a-c, f. 17, a-b; Segawa, Mar. Alg. of Susaki, in Sci. papers of Inst. of Alg. Research, Fac. of Sci., Hokkaido Imp. Univ., I, 2; 188, 1936, II, 1; 149, 1938; Okamura, Descriptions of Japanese Algae (in Japanese) 689, 1936.

Frons rosea, usque ad 6 cm. alta et plus minusve 6-8 dichotomis; segmentis divaricatis, basi leviter attenuatis, margine integra aut laminae parvas lobulae emittente, usque ad 2-3 mm. latis et plus minusve 300 μ crassis, apice attenuato obtusis aut bilobato late rotundatis; tetrasporis numerosis, plus minusve delimitatis, irregulariter rotundatis per superficiem totam profuse sparsis in cavernis, parvis et angustis, circa 65 μ in diam. et vert. et horiz.; cystocarpiis singulis aut pauciaggregatis; antheridiis nondum visis.

Type specimens: tetrasporic, Herb. Univ. Calif. 93480, Santa Barbara (ex Herb. Lorenzo G. Yates); cystocarpic, Herb. Univ. Calif. 266343, Santa Barbara.

The investigations of the Japanese workers have placed this genus and species in the family Champiaceae of the Rhodymeniales. Okamura has placed it in subfamily Champiae, Segawa, in subfamily Lomentarieae. A study of the tetrasporic plant shows that it belongs in the Lomentarieae as limited by Kylin (1931) since it has the tripartite tetrasporangia borne in shallow cavities as in *Lomentaria*. The cystocarps, too, agree with *Lomentaria*. It differs from *Lomentaria* in the structure of the thallus, being lacunose within instead of continuously tubular.

We wish to extend our sincere thanks to Professor David H. Linder, Curator of the Farlow Herbarium at Harvard University, for searching through the collections under his charge, and for sending us both Farlow's specimens and valuable extracts from his correspondence. To the Director and curators of the New York Botanical Garden we are indebted for the loan of specimens.

Agardh, J. G.

1894—*Analecta Algologica*, Continuatio II; 65.1898—*Species, genera et ordines Algarum*, III, 3; 140.1899—*Analecta Algologica*, Continuatio V; 158, pl. 1, figs. 6a, 6b.1901—*Species, genera et ordines Algarum*, III, 4; 134.

Britton, N. L., and Rose, J. N.

1920—*Cactaceae*, 2; 167.1923—*Cactaceae*, 4; 279.

Cleveland, Daniel

1880—*Marine Algae of San Diego*.

Inagaki

1933—*Oshorowan oyobi soren kinsetu seru Engan no Kaisankosōrui* (*Hōkkaidō-Teikoku-Daigaku, Rigakubu, Kaisō-kenyūzyo Hokoku*, 2); 43, f. 16, a-c, f. 17, a-b (in Japanese).

Kylin, H.

1931—*Die Florideenordnung Rhodymeniales*, in *Lunds Universitets Årsskrift. N. F. Avd. 2*, 27, 11; 26.

Okamura, K.

1936—*Descriptions of Japanese Algae* (in Japanese); 689.

Segawa, S.

1936—*Marine Algae of Susaki*, in *Sci. papers of the Inst. of Algol. Research, Fac. of Sci., Hokkaido Imperial University*, I, 2; 188.1938—*Ibid.*, II, 1; 149.

GROWTH REGULATORS OF PLANTS AND FORMATIVE EFFECTS
INDUCED WITH β -NAPHTHOXY COMPOUNDS

BY P. W. ZIMMERMAN

BOYCE THOMPSON INSTITUTE FOR PLANT RESEARCH, INC.

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β -Naphthoxyacetic acid is a growth regulator with a unique capacity for inducing formative effects of leaves, stems, flowers and fruit. It has in common with other substances of the auxin group the power to cause cell elongation, increase cell division and induce adventitious roots. There are, however, many qualitative differences in the capacity of growth substances to induce physiological responses. Of the fifty or more known growth substances⁹ the more active ones have some distinguishing characteristics when considered in relation to the various responses which they can effect.

β -Naphthoxyacetic acid was first mentioned as an active substance in 1938 by Irvine.⁶ In 1939 it was cited with other naphthoxy compounds by Zimmerman and Hitchcock⁹ as an active substance when applied in solution or as a vapor. Bausor^{1,2} published two detailed reports in 1939 and in 1940 Bausor, Reinhart and Tice³ reported on histological peculiarities induced with β -naphthoxyacetic acid. Killeffer⁷ in 1940 published